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# GEOGRAPHIC INTELLIGENCE REPORT

CUBA.

## PART XIV: CLIMATE AND WEATHER



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February 1960

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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PART XIV: CLIMATE AND WEATHER

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CUBA

PART XIV: CLIMATE AND WEATHER

General Weather and Climatic Conditions\*

Aside from the occurrence of tropical storms and hurricanes, the climate and weather of Cuba present few serious problems to

25X1C [REDACTED] The persistent trade winds are the dominant weather factor, but tropical storms and hurricanes generally account for most of the weather extremes. Temperatures and humidities are relatively high the year round but are rarely enervating because of the alleviating effect of the persistent easterly winds. Except for precipitation, most climatic elements vary little from month to month. Mean July temperatures, for example, are seldom much more than 10 degrees Fahrenheit warmer than January temperatures. Mean cloudiness varies more from place to place and diurnally than from month to month. The sky is seldom completely clear or completely overcast; mean cloudiness generally averages about two-tenths to six-tenths throughout the year.

Terrain features and the proximity to the ocean have a pronounced effect on the climate of Cuba. In fact, the elevation and exposure of a place together with its location relative to the ocean are generally the dominant influences. The persistent trade winds carry great quantities of moisture over all of the area, but the extent to which the moisture falls as rain depends largely on the elevation and configuration of the land over which the air passes. Thus, some of the more protected locations -- Los Caños Sugar

\* For the location of weather stations in Cuba, see Table 1 on p. 15.

Central, for example -- average less than 35 inches of precipitation annually, whereas other more exposed locations average more than 65 inches. There is, however, an over-all gradation of rainfall from west to east, the former receiving considerably larger amounts. Variations in terrain have a similar influence on the temperature and humidity. The warm ocean water, on the other hand, has a moderating effect on the air temperatures of nearby, low-lying coastal regions. Here the range of air temperatures is remarkably small, with average values in the middle 70's in the coldest month, February, and in the low 80's in July, August, and September. Temperature ranges increase toward the interior, especially in the mountains. (See Tables 2 and 3, p. 16 and 17.) 14.)

The climate of Cuba is tropical, characterized by two main seasons -- a wet season, which extends from May through October, and a dry season, which covers the period from November through April.

## II Special Meteorological Phenomena

Tropical storms and hurricanes, though severe, do not occur frequently and therefore are not crucial factors [REDACTED]

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[REDACTED] The possibility of the occurrence of storms, however, necessitates an understanding of their characteristics. Tropical storm and hurricane activity reaches a maximum during the wet season, with more than one-half of all storms occurring during September and October. The

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western part of the island, in particular, is affected by these storms, which are often accompanied by torrential rainfall, gale-force winds, and strong tides. These storms can be extremely devastating, causing heavy loss of life and property. Much damage to shore installations and shipping may be caused by the storm surge or so-called tidal wave associated with hurricanes. Considerable storm damage also results from the enormous amounts of rainfall that sometimes fall in a short period of time; Havana, for example, received over 20 inches of rain in 24 hours during the October 1926 hurricane. Such excessive rainfall results in the overflowing of streams and the inundation of lowlands, conditions that adversely affect the movement of personnel, vehicles, and supplies.

Although tropical storms affect the area throughout the wet season, full-fledged hurricanes (storms with wind speeds equal to or exceeding 65 knots) are generally limited to the period from July through October. The annual frequency of tropical storms varies from none in some years to a maximum of 11 in others, with an average of 3 storms per year striking the island at some point. The storm frequency is highest in the extreme west, where 70 storms were recorded in a 72-year period. The frequency decreases progressively to the east, reaching a minimum frequency (35 storms in a 72-year period) in the eastern half of Cuba, east of 79°W longitude. Almost 45 percent of the storms observed have been of hurricane intensity while in the vicinity of Cuba. During the peak of the hurricane season in September, over 50 percent

of all storms were of hurricane force. Tropical-storm paths typically bypass Cuba to the north or to the south. During October, however, storms sometimes move from south to north across the western end of the island.

Thunderstorm activity is also at a maximum during the wet season, with the greatest number of thunderstorms occurring in the western half of the island. Cienfuegos, on the southern coast of central Cuba, has an annual average of 99 days with thunderstorms and a monthly average of 20 days during the peak month of July. Baracoa, on the eastern end of the island, on the other hand, has no record of having experienced thunderstorms.

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1. North Coast

During the wet season (May through October) the weather

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is generally favorable [REDACTED] except for occasional periods, lasting several days, when tropical storms are passing to the north of Cuba. Most storms move parallel to the north coast but generally some distance offshore. These storms are accompanied by very heavy rainfall, high swell, and gale-force winds that affect coastal regions. Winds in excess of 50 knots have been observed at some time in each month of the wet season, and hurricane-force winds may occur.

Under normal conditions, easterly winds dominate the coast and average 5 to 10 knots. Diurnal wind variations exceed monthly variations. During the early morning hours the wind tends to be from the east, with speeds up to 6 knots. In the afternoon, winds become more northeasterly and are strengthened by the sea-breeze effect. High winds (28 knots or more) occur on 1 or 2 days per month, usually late in the wet season. Waves and swells are low to moderate and normally from the east to northeast. High swells, associated with tropical storms and hurricanes, occur infrequently -- less than 3 percent of the time.

Rainfall varies considerably with locality, but the rainfall regime is characterized by two peaks, one in May or June and the other in September or October. Rainfall in the wettest months is usually 4 to 8 inches. July and August are relatively dry. The entire wet season is characterized by heavy showers and thunderstorms, but they are of such short duration [REDACTED]

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Cloudiness is usually 30 to 80 percent, with low, broken cumulus clouds prevalent. Ceilings are generally above 2,000 feet. Visibility is usually good but is reduced to less than a mile during heavy showers. Fog is rare. The mean air temperatures range from 75° to 85°F, and the mean daily range of temperature is 10 to 15 degrees Fahrenheit. Mean sea-surface temperatures are very near the mean air temperatures.

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During the dry season -- November through April -- conditions are also favorable [REDACTED] However, conditions may be unfavorable for periods of up to 3 days during northers, which are characterized by gusty northerly winds, rain and drizzle, poor visibility, and falling temperatures. During November, tropical storms present another hazard [REDACTED] but are infrequent.

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Easterly surface winds dominate the coast during the dry season, also, and tend to be stronger and more from the northeast. Diurnal variations also occur as in the wet season, although the sea-breeze effect is less pronounced. Wind speeds average 6 to 12 knots, and high winds (28 knots or more) may occur on 2 or 3 days per month. They are generally associated with the cool polar outbreaks. Swells are low to moderate and normally from the east. High swells are relatively infrequent and are associated with northers and tropical storms.

Rainfall is slight, averaging 4 inches or less except over the eastern portion in November, when 5 to 15 inches occur. Thunderstorms

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can be expected on 1 or 2 days a month, most frequently in November and April. Freezing and frozen precipitation are unknown.

Cloudiness varies from about 25 percent to 60 percent, with cumulus clouds of small vertical extent predominating. In general, good visibility can be expected, but on rare occasions in the December-February period is reduced to less than 1 mile. Fog occurs on 1 or 2 days a month, but it is a negligible factor along the coast. Mean air temperatures are mostly in the 70's. The western portion becomes somewhat cooler during northers, but temperatures are rarely below the middle 50's. The sea-surface temperature is 1 to 3 degrees warmer than mean air temperature.

## 2. South Coast

During the wet season, weather is usually favorable

except during the passage of severe storms.

Tropical storms and hurricanes occur most frequently during the August-October period and bring very heavy rainfall and high swell when they pass near the coast. Winds of hurricane force are generally confined to those storms that pass in the immediate vicinity of the coast or cross the western end of Cuba near Cape San Antonio. Heavy squalls and thundershowers are often associated with pressure troughs in the deep easterly flow.

Surface winds are somewhat variable, although easterly winds occur some 40 to 50 percent of the time. Southerly and southwesterly winds reach a maximum of 25 to 35 percent during the height of the wet season. High winds (28 knots or more) are relatively infrequent,

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being recorded on 1 to 4 days per month. Swells are low to moderate and normally from the east or southeast. High swells are generally associated with tropical storms, and only occasionally with other causes.

Considerable rainfall occurs along the south coast, particularly in the west. Rainfall peaks occur in May and June and in September and October with peak amounts of 6 to 12 inches per month. The mountain ranges in Eastern Cuba cause considerable rainfall variation in that area. Thundershowers are observed on as many as 15 to 20 days a month in July, August, and September in the central and western sections.

Cloudiness is generally 25 to 65 percent, with low, broken cumulus clouds prevalent. Maximum cloudiness usually occurs in the afternoon. Visibility is generally good, being reduced briefly to less than 1 mile during rain squalls. Fog is rare.

Salt haze is prevalent with southerly windflow [REDACTED] 25X1C

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[REDACTED] The mean air temperature is generally in the lower 80's; the diurnal range rarely exceeds 15 degrees Fahrenheit.

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During the dry season, weather is generally favorable [REDACTED]

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[REDACTED] on the south coast, except during November tropical storms and northers. Tropical storms are infrequent, but they cause very heavy rainfall and high swell on the coast. Northers are often characterized by gusty northerly winds on the southern coast and are strengthened by the land-breeze effect

during the early morning hours. These winds can reach 28 knots or more on the average of 2 or 3 times a month during the period from December through February. Northeast and east surface winds predominate on the south coast and average 6 to 10 knots. In the sheltered areas, diurnal variations can be pronounced. Off-shore winds prevail in the early morning and onshore winds in the early afternoon. Calms occur most frequently during early morning hours, having been observed 20 to 60 percent of the time. Swells from the east and southeast have been observed over 60 percent of the time, occasionally interrupted by periods of southerly and southwesterly swells. Low to moderate swells are normal, but high swells may occur during northers and November tropical storms. Rainfall amounts to 1 to 4 inches a month, with the largest amounts falling in the transitional months of November and April. Thundershowers are infrequent.

Cloudiness varies from 20 to 50 percent, with scattered to broken cumulus clouds prevalent. Visibility is generally good, and only infrequently is it reduced to less than 1 mile. Low visibility can be expected during showers and during the passage of fronts in advance of cool polar air. Fog is infrequent along the coast. The mean air temperature is generally in the 70's and the daily range usually about 15 degrees Fahrenheit. Temperatures have been known to drop sharply during the cool polar outbreaks but rarely below 50° F. The sea-surface temperature is 1 to 3 degrees Fahrenheit warmer than the mean air temperature.

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Although storms are most frequent during the wet season (May through October), it is generally favorable [REDACTED] 25X1C

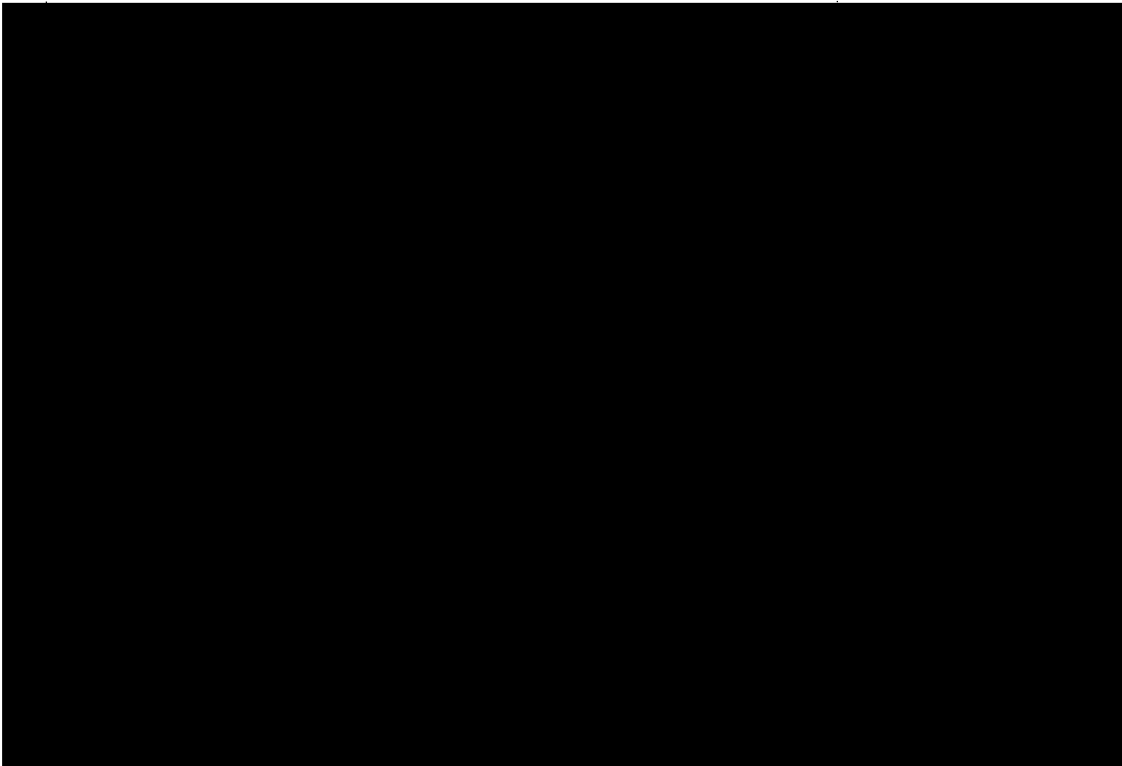
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[REDACTED] except during the two periods of peak rainfall -- May-June and September-October -- which are associated with the passage of tropical storms and hurricanes. The heaviest rainfall occurs on the Isle of Pines, western Cuba, and the windward slopes of mountains in Oriente Province. Most of the precipitation falls as afternoon showers, which are often of less than one hour's duration. This type of rainfall [REDACTED] only 25X1C slightly because the hot sunshine quickly evaporates the moisture. Day-long rains are rare, but maximum rainfalls amounting to 4 to 7 inches during a 24-hour period occur at some stations, and an absolute maximum of 20 inches has been recorded for Havana. Rainfall of such magnitude undoubtedly causes extensive flooding and inundation of low-lying regions.

Mean monthly temperatures vary only slightly, generally being in the high 70's or low 80's. The diurnal range is from 15 to 20 degrees Fahrenheit although a slightly greater range probably occurs along the higher mountain ridges. Absolute maximum temperatures are near 100°F. Prevailing winds are from the east with average speeds of 5 to 15 knots. High winds (28 knots or more) may occur 1 or 2 days a month, usually late in the wet season. Visibility is good except for short periods during squalls and thunderstorms, when it is reduced to less than 1 mile.

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The dry season is the most favorable time of year [REDACTED]

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[REDACTED] Mean monthly precipitation is generally less than 4 inches, reaching a minimum of less than 1 inch at many stations during January and February. The chief exception is the northern coast of eastern Cuba, where the rainfall in November averages 5 to 15 inches. The possibility of tropical-storm activity decreases rapidly during November and reaches a minimum in the period from December through April. Winds are predominantly from the east, speeds average 6 to 12 knots, and high winds (28 knots or more) may be expected on 2 or 3 days per month. High winds are commonly associated with November tropical storms or cool polar outbreaks. Mean daily temperatures are generally in the low 70's in January and February, the coolest months.

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The mean daily range of temperature is from 10 to 20 degrees Fahrenheit, with the greatest range in exposed interior regions. The lowest recorded temperature, 40<sup>0</sup>F, occurred in December at Camajuaní. Freezing temperatures could occur along the higher mountain ridges. Low ceilings and fog are more prevalent in the dry season than in the wet season, especially near sunrise, [REDACTED]

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[REDACTED]

Special adaptations to weather conditions are about the same as for the wet season, except that warmer clothing is required

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[REDACTED] in areas above 3,000 feet elevation.

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[REDACTED]

Adverse conditions can be expected only during the relatively rare occasions when easterly waves, fronts, tropical storms, and hurricanes or thunderstorms are in the vicinity. Among the unfavorable weather conditions are low ceilings, restricted visibilities, strong winds, and turbulence.

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[REDACTED]. Ceilings below 1,000 feet are infrequent, occurring less than 4 percent of the time. Ceilings below about 3,000 feet are infrequent in the mornings over most of Cuba but increase in late mornings and afternoons as cumulus clouds build up. Low ceilings, however, are frequent on all windward mountain slopes. The month of maximum occurrence of these low



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ceilings varies from station to station, depending on exposure and location.

Visibilities in the Cuban area are seldom very good or very poor, generally ranging between 7 and 15 miles. A persistent faint haze is present most of the time and visibilities over 15 miles are rare. Visibilities of less than 6 miles, however, may be expected less than 10 percent of the time. Low visibilities are most frequent at inland stations and are especially prevalent during early morning hours in the period from December through February. The combination of visibilities equal to or greater than 2-1/2 miles and ceilings equal to or greater than 1,000 feet occurs more than 95 percent of the time at most places.

Surface winds are generally from the east throughout the year as a result of the persistent trade winds. The strength of the trades is highly uniform, usually averaging 5 to 15 knots, with the lower average speeds in April and October. Although the trades blow much of the time, the land-breeze and sea-breeze effect is pronounced throughout the year and is at a maximum during the summer along the sheltered coasts. Onshore winds are prevalent in the early morning and offshore winds in the early afternoon.

Strong winds and thunderstorms are associated with polar fronts, easterly waves, and equatorial pressure troughs; gale-force winds are associated with the passage of tropical storms and hurricanes. Strong winds may occur in any month, but the period of maximum frequency is August through October. Thunderstorm activity

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reaches a maximum during the wet period, when 15 to 20 storms a month may occur in some regions. Thunderstorms are infrequent during the dry season, generally averaging less than 3 a month at most places.

Turbulence is seldom a serious problem in the area of Cuba. Severe turbulence is encountered only within thunderstorms and hurricanes, which are infrequent during the dry season, and they can usually be avoided [REDACTED] Light to moderate turbulence is sometimes found where trade winds move over mountain ridges. In the lower levels, turbulence may result from strong surface heating, especially over cleared areas during the warmer months of the year.

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Table 1

LIST OF WEATHER STATIONS  
(from: NIS 78, Cuba, Section 23, Map 20327)

STATION	LATI- TUDE*	LONGI- TUDE*	ELEVA- TION
	o 'N	o 'W	feet
Antilla . . . . .	20 50	75 43	10
Baracoa . . . . .	20 22	74 30	50
Batista Airfield . . . . .	22 53	82 30	156
Bayamo . . . . .	20 27	76 38	330
Cabo San Antonio . . . . .	21 52	84 58	29
Camaguey . . . . .	21 25	77 52	402
Camajuaní . . . . .	22 35	79 48	325
Caballos . . . . .	21 56	78 45	149
Central Conchita . . . . .	22 45	81 32	n a
Central Constancia . . . . .	22 14	80 33	n a
Central Elia . . . . .	20 58	77 27	n a
Central Francisco . . . . .	20 48	77 35	9
Central Hershey . . . . .	23 07	81 56	318
Central Los Caños . . . . .	20 03	75 08	n a
Central Lugareño . . . . .	21 35	77 29	n a
Central Manatí . . . . .	21 19	76 57	n a
Central Morón . . . . .	22 01	78 43	n a
Central Preston . . . . .	20 45	75 40	39
Central Río Cauto . . . . .	20 32	76 55	n a
Central Soledad . . . . .	22 07	80 20	58
Cienfuegos . . . . .	22 09	80 27	98
Ensenada de Mora . . . . .	19 53	77 20	n a
Gibara . . . . .	21 07	76 08	33
Guane . . . . .	22 11	84 05	n a
Guantanamo . . . . .	20 08	75 12	n a
Guantanamo Bay NAS . . . . .	19 54	75 09	54
Havana . . . . .	23 09	82 20	161
Herradura . . . . .	22 36	83 29	n a
Holguín . . . . .	20 53	76 16	350
Jatibonico . . . . .	21 56	79 11	n a
Jose Martí Airport . . . . .	23 01	82 24	225
Madrugá . . . . .	22 55	81 52	n a
Nueva Gerona . . . . .	21 53	82 48	200
Nuevitas . . . . .	21 33	77 16	10
Omaja . . . . .	20 51	76 45	275
Pinar del Río . . . . .	22 25	83 42	180
Punta Maisí . . . . .	20 16	74 09	21
San Julian Airfield . . . . .	22 08	84 09	186
Santiago de Cuba . . . . .	20 02	75 51	118
Santiago de las Vegas . . . . .	22 58	82 23	n a

n a Data not available.

\* Coordinates give locations of weather stations and do not necessarily correspond to those for populated places.

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Table 2

Mean Precipitation in Inches

Station	Elevation (feet)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Yrs Rec
Pinar del Rio	180	1.8	1.7	2.5	2.6	7.0	10.3	6.6	7.0	10.7	7.7	2.5	1.4	61.8	25
Havana	161	2.5	1.6	1.9	2.1	3.7	5.7	4.3	4.3	5.7	7.3	3.4	2.0	44.5	44
Cienfuegos	98	0.9	1.0	1.2	1.7	4.7	6.0	4.8	7.1	7.4	7.0	1.2	0.8	43.8	26-30
Camaguey	402	1.5	1.4	2.4	3.6	7.6	10.5	5.6	5.5	7.3	5.4	3.1	2.0	55.9	20
Santiago de Cuba	118	1.5	0.9	1.7	3.3	6.4	5.4	2.3	3.6	6.7	7.4	3.6	1.1	43.9	21
Baracoa	50	4.2	2.2	2.7	4.6	11.1	1.9	1.6	3.1	2.6	10.4	14.8	9.2	68.4	3-4

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Table 3

Mean Daily, Maximum, and Minimum Temperatures (°F)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Yrs Rec
Pinar del Río	71	72	75	77	81	82	83	83	82	79	75	73	78	20
Max	79	80	84	86	89	89	91	91	89	86	82	80	85	20
Min	64	64	66	68	72	74	75	75	74	73	68	65	70	20
Havana	72	72	74	77	79	81	82	82	81	79	75	72	77	60
Max	76	77	78	80	82	83	84	84	84	82	79	77	81	21
Min	64	63	66	69	72	74	75	75	75	73	68	64	70	21
Cienfuegos	74	74	76	78	80	82	83	83	82	79	76	75	79	13-16
Max	82	82	84	86	89	90	91	92	89	87	83	82	86	4-5
Min	61	61	64	66	68	71	71	71	71	69	65	63	67	4-5
Camaguey	72	73	76	78	79	80	82	82	80	79	77	73	78	13
Max	81	83	86	88	89	89	91	91	90	87	84	82	87	13
Min	63	64	66	68	70	71	72	72	71	70	67	64	68	13
Santiago de Cuba	75	75	77	78	80	81	82	82	81	80	78	76	79	16
Max	83	83	84	85	86	87	89	90	88	87	85	83	86	16
Min	68	68	69	71	73	74	75	75	74	73	71	69	72	16

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